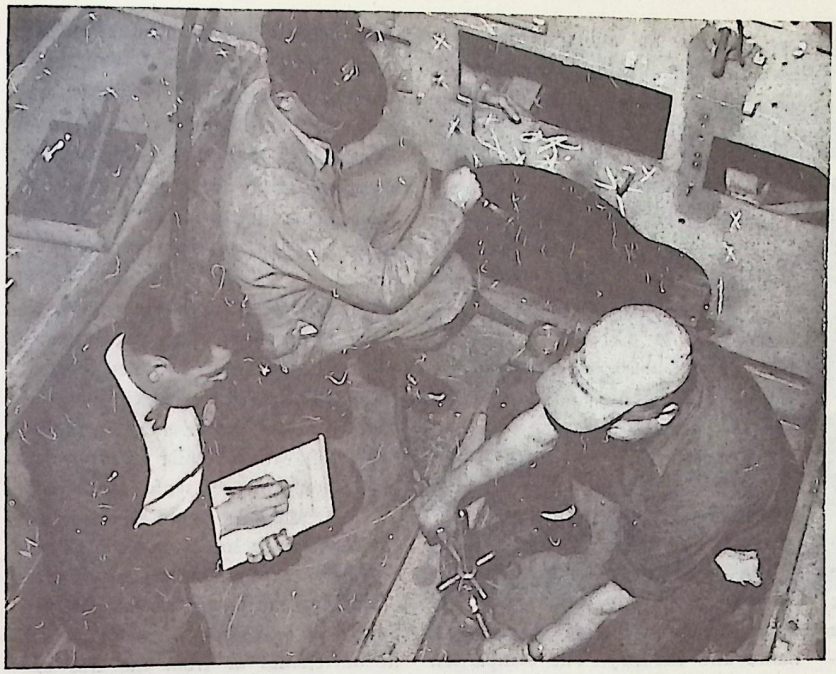

Management engineering trainee conducts job analysis at Rock Island Arsenal.

Management Engineering

Ordnance Trains Key Employees To Solve Specialist Shortage

Col. R. E. Peters

WHEN, shortly after the outbreak of hostilities in Korea, the Army Ordnance Corps had to double, then triple its military and civilian work force and multiply its production of military matériel a hundredfold, it paid more than lip service to the spreading concepts of modern industrial management.

High Priority Given

Placing the same high priority on management men as had already been placed on scientists and engineers, Ordnance set up a Management Engineering Training Program and implemented it with a school located at Rock Island Arsenal, Rock Island, Ill., and followed through its scheme of action so that by July of this year it could count 1,500 alumni of its school, representing 90 of 97 Ordnance installations nationwide.

Management schools for promising white-collar workers and junior executives have long been an integral part of many large corporations. Schools for men with managerial capacities have been considered as essential as schools for machinists.

General Motors, Ford, Du Pont, General Electric, and similar corporations have run permanent or semi-permanent schools for years on the principle that executive ability is the product of extensive training as well as the gift of natural talent.

Demand Exceeds Supply

In the past decade, the demand for trained management men has more than overdrawn the supply. Corporations have found that to keep pace with growing size and more complex operations, they must assiduously ferret out and train men who possess an unusual aptitude for managing large-scale manufacturing processes. Indeed, they corral graduates fresh out of the country's many industrial management schools, but additional training is forever necessary.

Ordnance's school is an offshoot of this mushrooming movement. It is just another manifestation of a tested idea.

Revolutionary

But in other respects, the school is revolutionary. Though financed and operated by Ordnance, it is devoid of the multitarious regulations and rules that often strait-jacket a military school. Likewise, though situated on arsenal grounds, it is in every way a tiny college smacking of the free exchange of ideas usually associated with a university campus.

Its staff, most of whom carry graduate degrees in industrial engineering and related subjects along with experience in industry, is primed with the latest ideas on management techniques, and if some of the written material used in class suggests the dryness of a training manual, the resemblance is purely accidental.

Full-Fledged Experiment

Ordnance's school is the first full-fledged experiment in developing management men ever attempted within the military establishment. Various branches of the Government and the military services have tried, at times, to apply to their organizations the advanced techniques of management which companies and universities have uncovered over the past decades.

Generally speaking, these attempts have been either piecemeal or plain unsuccessful. In the military sphere, fresh management ideas have been hide-

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bound by the "command function" which tends to force rather than persuade a man to do something, which, in its worst form, bosses rather than leads.

And, until recently, the law of the land has provided hidden obstacles. Since World War I, Congress had tagged annual appropriation bills with riders prohibiting the use of refined, up-to-date industrial engineering techniques in managing Government agencies or installations.

Ban Lifted

Then in 1949 Congress, evidently realizing that the introduction of scientific management would not only increase output but would also improve employee conditions, lifted the ban. The follow-up was Executive Order 10072 from President Truman which requested an accelerated pace of management improvement in Government agencies.

It is perhaps logical that Ordnance made the first definitive step. A commanding officer in a combat zone must give orders and expect them to be obeyed; in the immediate execution of his command decisions rests the possibility of saving hundreds, perhaps even thousands of precious lives.

But a commanding officer in an arsenal, procurement center, depot, or plant operates in an entirely different climate. His worries are economy of manufacture, efficiency of office work, and coöperation of employees. His problem of directing a group of men is not the exercise of control such as he must use in combat; instead, he has the responsibility for getting the most out of a freewheeling group of men and women, the majority of whom are civilians.

The commanding officer, his staff, his supervisors, and the mass of employees under him are, of course, under Government regulations. The installation is military, as it should be, and requests, directives, regulations, and orders coming from the Office of the Chief of Ordnance command a disciplined response.

But strip an Ordnance installation of its military paraphernalia—the officers blouses, the military titles, the special stock numbering, the occasional olive-drab paint job, and all those trappings which are peculiar to the military—and basically it is the duplicate of private industry. The structure and aims are almost the same.

An Ordnance arsenal, for example, designs, engineers, builds, and distributes a product or many products. The human-relations problems that arise in these phases of manufacture parallel those in industry. The commanding officer, civilian chief, works manager, branch chief, and chief engineer must be as adept and as versatile as a top-flight industrial staff.

Shop work, materials handling, accounting procedures, and many other facets are also common to both Ordnance and industry. The comparison is weak in spots, for Ordnance fulfills a mission while industry seeks a fair profit; Ordnance produces mostly pilot lots while industry makes what the market will absorb, and so on. But of all military activities, Ordnance best characterizes industry in uniform, the civilian-soldier on a Paul Bunyan scale.

Awaited Cue

This is the broad setting in which to view Ordnance's exploratory interest in management. With these general considerations alive, Ordnance awaited the cue for action.

The outbreak in Korea signaled an opportunity for management improvement. Loaded with the responsibility for quickly producing weapons and matériel, Maj. Gen. E. L. Ford, Chief of Ordnance, took inventory of his organization's resources. The urgent problem was manpower.

What General Ford had was efficient but small. In the rush of production he would have to increase his work force from 60,000 civilians to about 170,000. Ordnance would be severely handicapped by the relative inexperience of these additional tens of thousands.

Fully aware of the need for mechanics, engineers, contract negotiators, scientists, and other specialists, General Ford nevertheless pictured the problem as an over-all task of management.

Soon after President Truman's order appeared, General Ford had set up management offices in all major installations. Though performing useful functions, such as analyzing manpower requirements, these offices tended to retrace old rather than break new paths.

What General Ford wanted, apart from offices, was the development of new attitudes toward management problems—in a sense, a management psychology which, while operating in conformance with rules and regulations, would sanction any approach to the solution of a problem as long as it proved useful.

The final satisfactory approach might flow from accredited ideas developed in universities or from the free exchange of ideas among Ordnance personnel or from a continuous reëxamination of the operational structure of an installation. The solution for a problem would be tried before the jury of economy and efficiency and judged either useful or useless.

To this end General Ford appointed in October of 1951 a choice committee of five civilians—Dr. Philip Hensel of Toledo University, Dr. Russell Moberly of the University of Wisconsin, Dr. Marvin E. Mundel of Purdue University, Berger Stockfleth of Pacific Engineers, and Lee Osborne of the Wassell Corporation.

This committee, pooling its academic and industrial knowledge and consulting with representatives of Ordnance's Civilian Personnel and Training Office, assembled, digested, and simplified quantities of information presented to it.

Definition Given

As a starting point the committee crystallized its thinking into a hard definition of management: "Management designs, predicts the performance of, and controls an integrated group activity, the related physical facilities, and the interrelationship of the two."

The committee determined that by its very nature management lacks rigidity and that its operational character works in a dynamic pattern

where planning leads to activity and activity, in turn, feeds back new information to the planner. In sequence, management sets the aim, gathers data, makes a decision, and implements the decision with tools, techniques, and training.

Changing Relationships

But, as indicated in the definition, the end results of management can only be thought of in terms of continuously changing relationships which prompt new decisions. The feedback principle is circular, flexible, and shifting.

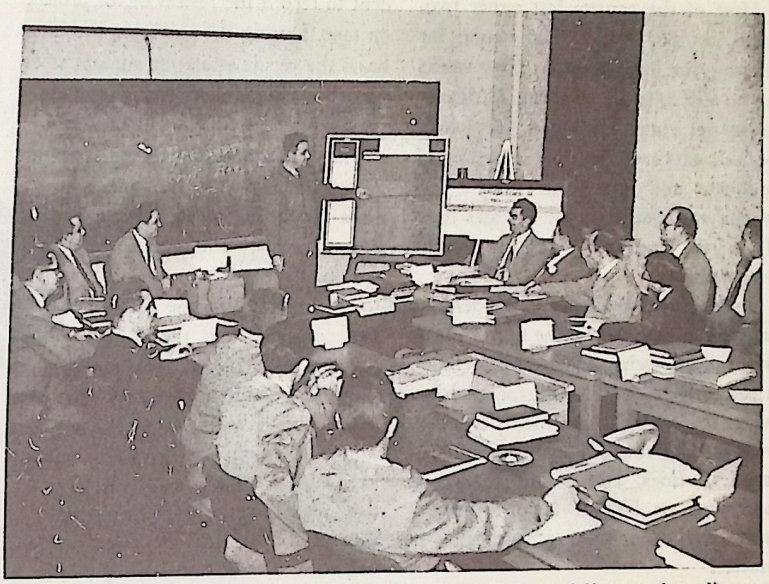
The committee next isolated the problem areas in its definition and pinpointed the data and design areas as the most crucial. Complete, understandable data precede sound decisions, and sound decisions demand careful evaluation. From this the committee decided that, to carry through a program of management improvement, Ordnance had to teach as many key employees as possible the techniques for gathering data and making decisions.

Three Choices

Finally the committee offered three courses of action: management consultants, traveling teams, and direct schooling. The first two were scratched as unrealistic. Consultants would face the insurmountable task of absorbing in a short time quantities of information, specialized nomenclature, and the peculiarities of a monolithic organization. The consultants would also have to cope with the reluctant welcomes which installations might proffer to "snooping" outsiders.

Traveling teams of management experts, incorporated fully into the Ordnance organization as working members, would have an easier time of it, but even if the team steam-rolled through one installation each week, it would take over two years (allowances for vacations and sickness included) to complete the circuit through Ordnance's ninety-seven installations.

The establishment of a school, the committee concluded, showed the greatest promise. It would be simpler to bring management techniques into Ordnance than to try to package Ordnance's problems and methods in a dossier for a management consultant to examine. A school would better match theory to practice—in other words, apply management techniques to urgent Ordnance problems.



Members of a class in production planning and control listen to fellow student discuss a production control device as part of the management engineering program.

Employees pulled from all parts of the country would learn merely from personal contacts and conversations. And beyond this, students at such a school would improve letter and telephone communication between installations by seeing how their function at installation A fitted in with a related or seemingly unrelated function at installation B.

All pros and cons resolved, the committee recommended a school, and Rock Island Arsenal became the winning candidate as a suitable site. Built on an island in the Mississippi River, it is a central location geographically, and the "Quad Cities" surrounding it—Davenport, Rock Island, Moline, and East Moline—provide ample hotel accommodations for visiting students.

Col. Walter W. Warner, Rock Island's commanding officer, responded sympathetically and helpfully and, with the assistance of Capt. Norman Allhiser, a Reserve officer on active duty who had been a professor of industrial engineering, completed the physical arrangments.

The last hurdle was the appointment of a director. Here Ordnance was fortunate to lease the talents of Dr. Mundel who had served on the original management committee. At General Ford's request, President Frederick L. Hovde of Purdue University granted Dr. Mundel a leave of absence so he could accept the new position. Dr. Mundel's own ready acceptance of the directorship put the school in high gear, and classes first met on April 21, 1952.

The Curriculum

The school's curriculum consists of nine courses. The basic group of courses which principally deal with improving the efficiency and economy of specific jobs and single operations are methods improvement, work measurement, procedure analysis, and management statistics. The next group includes the control courses—production planning and control, organization analysis, and manpower control—which plot the layout and coördination of operations and the optimum utilization of manpower.

Executive Courses

At the top are two "executive" courses, the management seminar which probes the highest levels of planning and the 3-day appreciation course which briefs commanding officers and civilian chiefs on what their subordinates learn while attending the school.

Most of the courses last either two, three, or four weeks. The reason for limiting the instruction to a few weeks is the difficulty in releasing Ordnance personnel from their jobs for longer periods of time. To pack a welter of problems and information into a few weeks' span, each course operates from 8 in the morning to 4:30 in the afternoon.

Instead of requiring a student to take notes laboriously, the school hands out enough printed material to fatten a briefcase to the bursting point. Likewise, the school supplements the conventional blackboard with hundreds of movies, slides, and sound recordings borrowed or bought from industrial, university, and Government film libraries.

High-Powered Course

Most high powered of the courses is the top-management seminar. As in the other courses, this one is held to a 20-man enrollment, but unlike the others it is taught by guest lecturers representing business, industry, consulting firms, and educational institutions. Sixty experts have lectured so far, some of them for the third and fourth time.

The seminar knifes into the very core of management problems, asking questions such as "When is centralization advantageous?" and "Are the terms 'power' and 'authority' synonomous?" and "What fundamental principles must be followed for the development of effective committees?"

The other courses focus on less abstract phases of management and encourage what Dr. Mundel calls "fractionating a problem" or "giving it specificity." The student, utilizing scientific procedure, breaks down the problem under discussion as a chemist separating elements hypothesizes an acceptable answer.

Although the school makes learning as painless as possible, each student must read and report on assigned books. The student also puts into practice his classroom knowledge by tackling specific projects in Rock Island's shops.

To improve public speaking, the school, in many cases requires a student to record the results of his project on tape. During the playback, the class hears the report while the student sizes up the effectiveness of his public speaking.

The school's criteria for judging the success or failure of a project are a mixture of idealism, sure-fire concepts, and rules of thumb.

To illustrate, in the area of staff organization the school suggests three ideal relationships: Every man must have only one boss; every man must know the limits of his job; and every man should keep his boss informed. Easy to establish these relationships, isn't it? In actuality, it is just the opposite; few organizations can honestly say they have firmly established these relationships.

A useful concept in the methods-improvement field is a breakdown of production engineering changes by complexity. The simplest change would be an alteration in hand and body motions. A more complex change, involving outlay of money, would be new tools and equipment.

Increasing Complexity

The remaining three changes, each increasing in complexity, would be shifting the sequence of operations in a production process, redesigning the product itself, and substituting one raw material for another.

The handiest guide for estimating the value of a management idea is a check-off list put together by the school. Will the idea or project mean fewer people, less idle time on equipment, less in-process inventory, fewer forms, less cost, better control, better planning, less materials handling, and more accurate information? The more factors influenced in a positive direction by the idea, the better rating the idea gets.

The school shies away from pat answers. Management is like psychiatry—every case is individual. The man from one installation may be frustrated by a peculiar labor market, another man may suffer from the dilemma of excess paperwork, and so on.

Consequently, the school acts as diagnostician, describing the illnesses in management that are common to all installations but facing individual problems with an open mind.

The school's special "bedside manner" is to provide coffee breaks, restful armchairs, fluorescent lights, and similar conveniences, on the assumption that the comfortable student is the most receptive and articulate.

By the end of several weeks, the student finds himself refreshed with a new attitude toward management and a capacity for talking about "curves of probability" and "behavioristic psychology."

Results Pouring In

What does this experiment add up to? The results are flowing into the Office of the Chief of Ordnance and the school headquarters. First, graduates initiate money-saving projects upon return to their home installations.

Secondly, each graduate is a potential instructor. Armed with a teaching outline which the school gives him on his departure, the returning graduate can establish management training at the local level.

Thirdly, a host of small but significant improvements evolve from having OMETP-trained personnel working at installations.

One project sliced in half the work force on a production line at an arsenal. Another cut paper work in a district by ten per cent. The roster of accomplishments is long. Savings have been as small as $100 and as large as an estimated $500,000.

Invisible Gains

It is virtually impossible to assess the school's value in pure dollars and cents. Invisible gains radiate in all directions—horizontally across the staff level and vertically down to the machinist.

Call these unseen accomplishments "better morale" or "enlightenment" they all boil down to a policy of management whereby the human factor —the relationship of operator to operator, manager to assistant manager, civilian to military—is foremost in production planning. The approximate cost per graduate: $100.